

Database Management: Normalization Exercise Suite



The **Emergency Service & Product (ESP)**

Company is a very small parts and service company. It currently uses a crude paper based system (3 by 5 cards, paper journal, etc) to keep track of its customers, inventory, suppliers, payments and invoices.

The company is growing rapidly and has found that it is unable to keep pace with the volume of data it must record about its business activities. It has decided that it wishes to automate some portions of its business.

You have been hired to assist the company in analyzing its business activities and to design a set of relational tables that they can use to develop a database system.

The company will provide you with copies of all their paper based forms (invoices, orders, batch records, etc). You will use these over several weeks to analyze the various forms and produce **third normal form (3NF)** relational **entity relationship diagrams (ERD)** for each **view** of their data. As a last step in the process, you will **merge** all the views to produce **one integrated ERD** and **fully detailed relational entities**.

Inventory Control

ESP keeps track of its inventory using a paper based ledger system where purchases from suppliers are recorded for each item that they have in stock.

The system uses a form that looks as follows:

Inventory Control Sheet				Item #: <u>M24</u>
Item Description: <u>Bolts - 24 mm</u>				
Current Sale Price: \$ <u>0.29</u>				
Order History				
Date	Supplier Number	PO Number	Quantity	Cost
July 1, 1998	7	125	1000	0.13
August 2, 1998	10	131	2000	0.13
September 5, 1998	7	149	2000	0.14

Item Numbers are unique and never reused. The Inventory Control Sheet records details of each item as well as all orders of that particular item from a supplier. ESP would like to be able to keep track of how many of each item they have in stock on an on-going basis so that they can use JIT (Just In Time) ordering rather than ordering when they run out. They would like the new system to keep an in-stock count for each item as well as a re-order value. If the in-stock count is less than or equal to the re-order level the item will be ordered from a supplier.

Purchase Orders

When items are ordered from suppliers a Purchase Order is created. A sample Purchase Order is shown below.

Item#		Supplier's Item #	Supplier's Description	Qty	Cost	Supplier's Amount
H23	S103	Heater Fan Belt - 23"	1	11.99		
H319	B11a	Heater Fan Support Brackets	2	4.99	9.98	
M24	ISO4	Bolts - 24 mm	1000	0.13	130.00	

Purchase Order (PO) numbers are unique and never reused. The same supplier always has the same supplier number (which is also unique) and the supplier details are hand-written on the PO every time.

The item number is the number assigned by ESP from the Inventory Control Sheet and is the same regardless of supplier the item is purchased from. The Supplier's Item Number and Description are specific to the supplier and may vary on different Purchase Orders. The cost of the item depends on the

supplier and may vary between different purchase orders for the same supplier.

You are to take the information provided above and prepare a set of **3NF** relational entities and produce a relational **3NF ERD** for each view.

Merge the schemas for the Inventory Control view and the Purchase Orders view.

Merge the schema for the two views in ESP # 3 with the schema for the previous views to produce a single set of tables that will support the needs of all the ESP views completed to date (Customer Details, Customer Orders, Customer Payments, Inventory Control and Purchase Orders).